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Classification of two poorly known genera of African Phoridae (Diptera)

by

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ABSTRACT

The previously unknown male of the genus *Brachyselia* Schmitz is described, including details of the male terminalia. Based on the structure of the male terminalia, this genus belongs in the subfamily Phorinae, sensu Brown (1992*a*). The terminalia of the genus *Mannheimsia* Beyer are described; this genus is also classified in the Phorinae. The Oriental region genus *Chouomyia* Liu is a synonym of *Mannheimsia*, and both *C. dactyloformis* Liu and *C. ramai* Mostovski are synonyms of *C. stylodactyla* Liu. The female abdomen of *M. stylodactyla* is described for the first time. New combinations are *M. stylodactyla* (Liu) and *M. tianzena* (Liu).

KEY WORDS: Diptera, Phoridae, *Brachyselia*, *Chouomyia*, *Mannheimsia*, Afrotropical, Oriental, classification, new combination, new synonymy, taxonomy.

INTRODUCTION

Classification of the recognised phorid genera is a contentious issue among the few of us working on phorid flies (e.g. Brown 1995; Disney 1993, 1995). Studies on phorid relationships are hampered by there being insufficient structural characters to analyse, and by the extreme diversity of modern taxa. Debates on classification are likely to be completely resolved only after intensive molecular investigation, but this work is still in its early stages (Brown & Smith *in prep*.; Cook *et al*. 2004). Meanwhile morphological studies will continue to contribute to revisions of the classification of phorid genera (e.g. Disney 2003).

When reviewing the basal (= non-Metopininae) phorids in a revision of the phorid genera, I recognised seven genera whose males were unknown or whose classification was uncertain (Brown 1992*a*: 87). Of these, I have already dealt with *Rhynchomicropteron* Annandale and *Gymnoselia* Schmitz, which turned out to be the males of *Rhynchomicropteron* (Brown 1992*b*), and *Postoptica* Disney (Brown 1994). Two of the remaining four unassigned genera are the African *Brachyselia* Schmitz and *Mannheimsia* Beyer, both of which are dealt with here.

MATERIAL AND METHODS

Terms are those of the Manual of Nearctic Diptera (McAlpine 1981), as discussed by Brown (1992*a*).

Most specimens are from the following collections:

LACM – Natural History Museum of Los Angeles County, USA.
MRAC – Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

TAXONOMY

Brachyselia Schmitz, 1927

Brachyselia Schmitz, 1927: 68.

Diagnosis: Frons opaque, lacking medial furrow, with 4-4-4 frontal setae and one pair reclinate supra-antennal setae. Lateral ocelli widely separated, ocellar triangle not differentiated from rest of frons. With 1–2 large postgenal setae. Flagellomere 1 round, arista dorsal. Palpus relatively small, with several subapical setae. Scutum with one pair dorsocentral setae well anterior to posterior margin. Anepisternum without furrows. Wing fully developed; vein R_{2+3} absent; vein Rs with large basal seta and few smaller setae along length. Hind femur narrow. Tibiae lacking large isolated setae, except hind tibia with 2–3 dorsal setae; all tibiae lacking setal palisades. Left side of epandrium greatly elongate, narrowed, with narrow ventral process (Fig. 1) that extends medial to hypandrial lobe; majority of left side of epandrium apparently equivalent to fused left + right surstyli (Brown 1992*b*) fused to epandrium. Right side of epandrium broad, with posteroventral setae (Fig. 2). Left lobe of hypandrium with broad, setose process (Figs 1, 3); right lobe with two processes—more medial, narrower process and broader right lateral process (Fig. 3).

The male keys to couplet 11 of Disney's (1994) male key, where it has trouble passing the two possibilities. The first lead states 'Costa less than two-fifths wing length. Medio-lateral and pre-ocellar bristles absent [*Euryophora*]' versus 'Costa extends about half wing length or more. Medio-lateral and pre-ocellar bristles present [couplet 12]'. In *Brachyselia* the costa is 0.38 wing length, matching the first part of the first lead, but all frontal setae are present, matching the second half of the second lead. Females key without trouble in Disney's female key.

Included species: This genus includes only *B. natalensis* Schmitz (1927, 1929), described from female specimens collected in KwaZulu-Natal, South Africa.

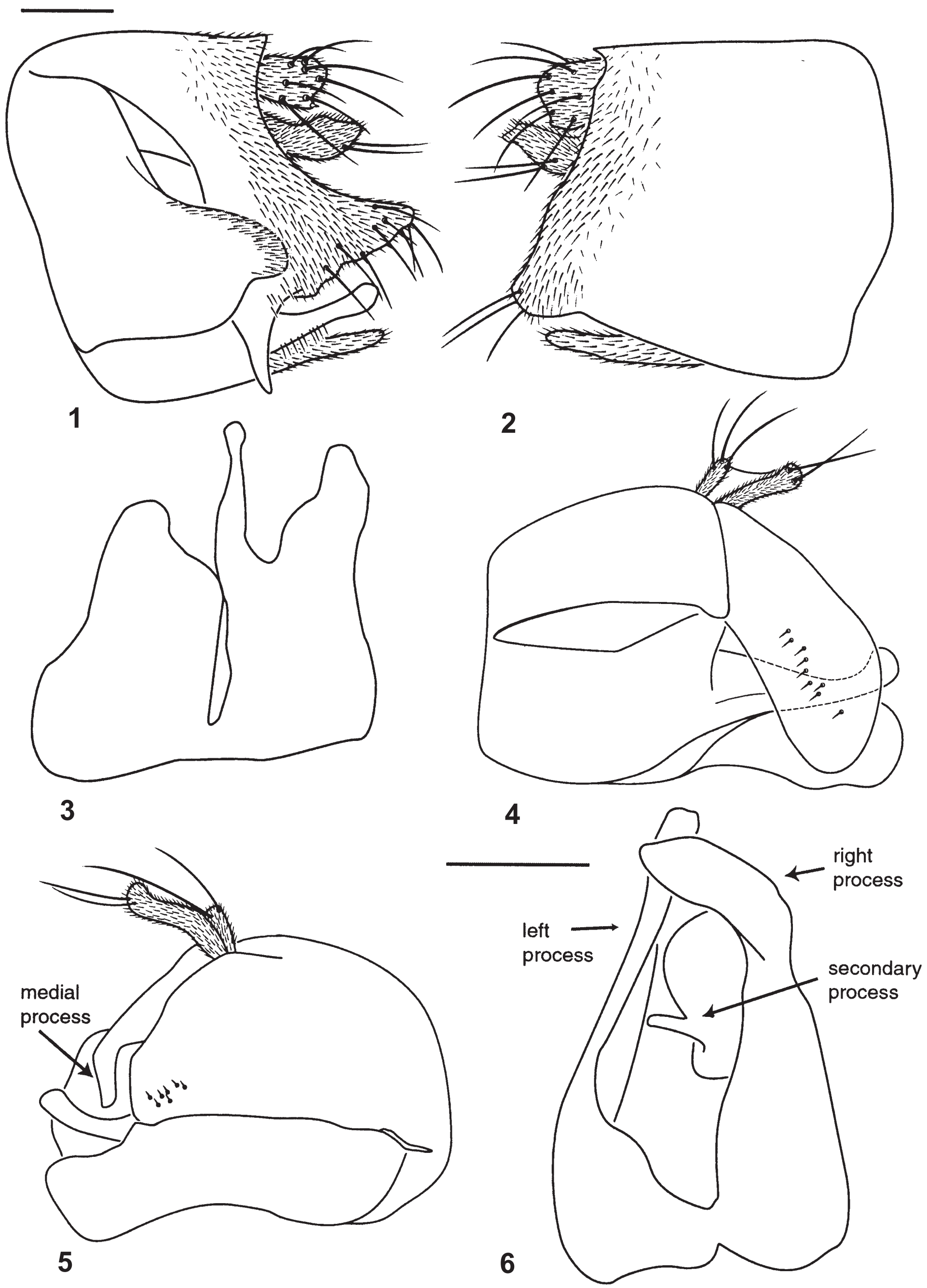
Material examined: BOTSWANA: Serowe, Farmer's Brigade (22.42°S: 26.73°W), 2♂ 2♀ xi.1992, 2♀ xii.1992, P. Forchhammer, Malaise trap (LACM).

Subfamily classification: Based on the elaborated, bilobed process of the right lobe of the hypandrium, this genus belongs in the Phorinae sensu Brown (1992*a*, *b*). Structurally, the terminalia resemble those of *Coniceromyia* Borgmeier, *Plethysmochaeta* Schmitz, and *Rhynchomicropteron*, with a largely fused process on the left side of the epandrium, which is overlain by the hypandrial lobe. Both *Plethysmochaeta* and *Brachyselia* have wing vein Rs setose, and based on this character they could be sister-taxa.

Mannheimsia Beyer, 1965

Mannheimsia Beyer, 1965: 28. Type species *M. stricta* Beyer, 1965 (original designation).
Chouomyia Liu, 1995: 185; Mostovski 1997: 876. **Syn. n.**

Diagnosis: Frons with 4-4-4 frontal setae and one pair dorsally pointed supra-antennal setae. Flagellomere 1 globose, arista dorsal. Well-developed basal postpronotal seta present. Scutellum with two pairs of long setae, posterior pair larger. Anepisternum setose, with shallow, poorly-developed furrow (Fig. 11). All tibiae lacking dorsal setal palisades. Apical two-thirds of foretibia with dorsal row of thickened, short setae, the most basal longer than the others. Midtibia with one near dorsal and one slightly more apical anterodorsal seta near basal one-third. Hind tibia with one large anterodorsal


1
2
3
4
right process
left process
secondary process
medial process
5
6

Figs 1–3. *Brachyselia natalensis* Schmitz, male terminalia: (1) epandrium, left side; (2) epandrium, right side; (3) hypandrium, ventral.

Figs 4–6. *Mannheimsia stricta* Beyer, male terminalia: (4) epandrium, left side; (5) epandrium, right side; (6) hypandrium, ventral.

Scale bars = 0.1 mm, all figures to approximately same scale.

seta near midlength and smaller one near apex. Wing fully developed in both sexes. Wing vein R_{2+3} absent. Base of wing vein Rs with two setae. Epandrium with one surstylus-like subepandrial process on left side; medial surface of process with elongate, fingerlike extension. Hypandrium with elongate process on left lobe; right lobe with a more ventral medially concave process and more dorsal, secondary process of varied structure.

Note: When writing his key to phorid genera, Disney (1994) followed Beyer's original description of the genus in the possession of an apical arista; however all specimens I observed have what I consider to be a dorsal arista (Fig. 15).

Subfamily classification: The hypandrium of this species, with its two processes, is highly unusual, but overall the genus appears to belong within the Phorinae sensu Brown (1992*a*). The subepandrial process (fused left + right surstylus) is fully separate from the epandrium, a character state hypothesized to be primitive relative to *Brachyselia*, *Coniceromyia*, *Plethysmochaeta* and *Rhynchomicropteron*. In this genus, it has a distinctive fingerlike medial process (Figs 5, 7, 8).

Detailed observations on the male terminalia of *Mannheimsia*, and comparison with species of the Oriental Region genus *Chouomyia* shows that they are congeneric. Especially distinctive are the structure of the hypandrium, with a long, narrow, left process, the right hypandrial lobe with its secondary process, and the anepisternum, with its faintly indented anepisternal furrow (Fig. 11). The anepisternal furrow is similar to that found in Metopininae (Fig. 12), but shallower and less developed. Previously, because of the anepisternal furrow, I stated (Brown 1992*a*) that this genus should be transferred to the Metopininae, but the structure of the male terminalia convinces me that this is incorrect.

New combinations arising from this synonymy are *M. tianzena* (Liu) and *M. stylodactyla* (Liu), both from China. I consider *C. ramai* Mostovski, from Thailand, a synonym of *M. stylodactyla* (see below).

Besides the known species, I also have a female specimen from the Philippines that cannot be identified to species at this time.

Mannheimsia stricta Beyer, 1965

Figs 4–6, 15

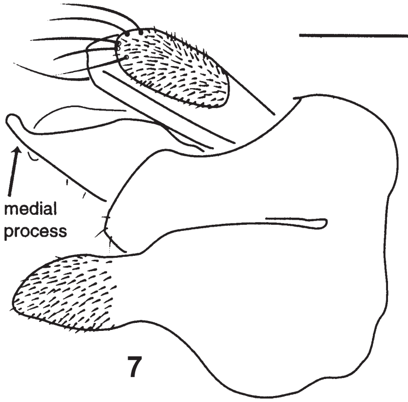
Mannheimsia stricta Beyer, 1965: 29.

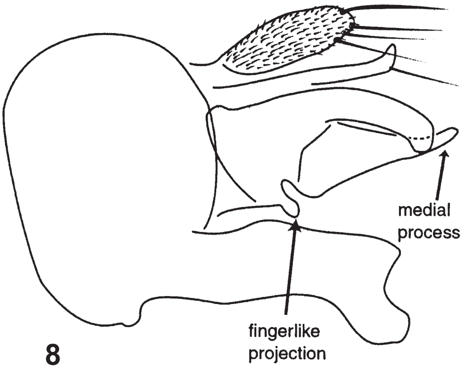
Male terminalia: Epandrium relatively unmodified, without large setae (Figs 4–5). Long subepandrial process (sensu Brown 1992*a*) present, apparently as left surstylus but hypothesised to be shifted left + right surstylus; process with long, narrow medial process (Fig. 5). Left lobe of hypandrium with greatly elongate, narrow process; right lobe with greatly elongate, medially concave process (Fig. 6) and more dorsal, rounded secondary process with elongate, fingerlike extension.

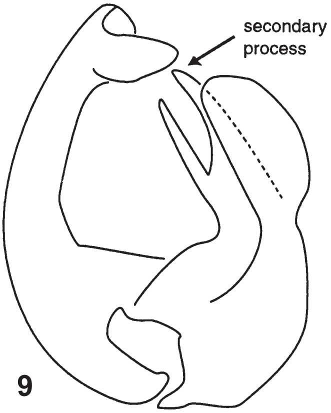
Holotype: CONGO: ♂, Kivu, Rutshuru, 1285 m, 7.vi.1935, G. F. de Witte, 1420 (examined; MRAC).

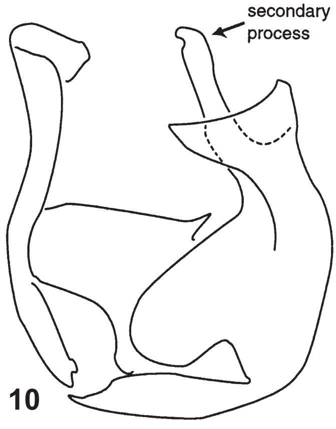
Other material examined (all paratypes): CONGO: Bambesa, 1♀ i.1935, J. Leroy (MRAC), same data as holotype, 1♂ 29–30.xii.1933, 1♀ 22.v–4.vi.1934, 1♂ 8.vi.1934 (MRAC).

Remarks: The holotype and most of the paratypes are in extremely poor condition; one male specimen collected 8.vi.1935 is completely intact and in good condition.









Figs 7–9. *Mannheimsia stylodactyla* (Liu), male terminalia: (7) epandrium, right side; (8) epandrium, left side; (9) hypandrium, ventral.

Fig. 10. *Mannheimsia tianzena* (Liu), hypandrium, ventral.

Scale bar = 0.1 mm, all figures to approximately same scale.

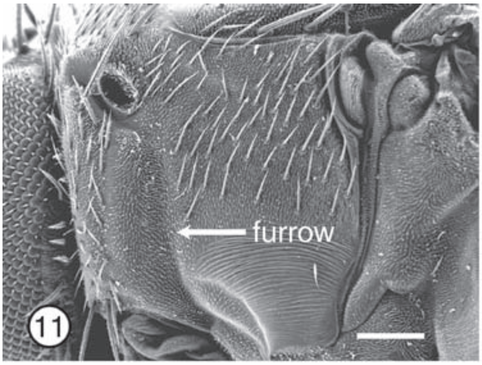
Mannheimsia stylodactyla (Liu, 1995), **comb. n.**

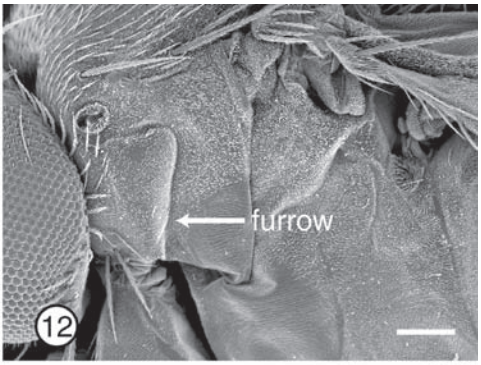
Figs 7–9, 11, 14

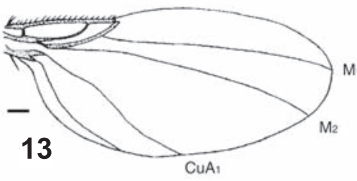
Chouomyia stylodactyla Liu, 1995: 186–188, figs 11–20.
Chouomyia ramai Mostovski, 1997: 876, figs 1–8. **Syn. n.**
Chouomyia dactyloformis Liu, 2001: 129, 231. *Lapsus* for *M. stylodactyla*. **Syn. n.**

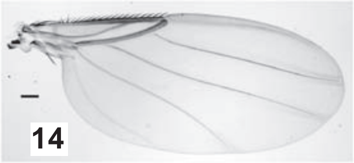
Female abdomen: Tergites 1–6 present; tergite 6 divided medially, but otherwise normal. Venter of abdomen with small setae; posterior margin of segment 6 with longer setae. Segment 7 lacking tergite, but with elongate, narrow, slightly apically clavate sternite. Segments 8–10 without tergites or sternites; cerci present, but relatively short.

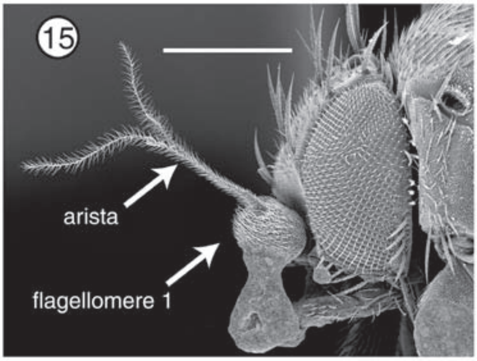
Type material: *C. stylodactyla* Liu, Holotype ♀, CHINA: *Yunnan*: Menglun, 22.v.1991, G. Liu, Y. Wang (Shenyang Agricultural University Collection; examined).











Figs 11, 12. Scanning electron micrographs of pleuron: (11) *Mannheimsia stylodactyla* (Liu); (12) *Megaselia* sp.

Figs 13, 14. Wings: (13) drawing of *Mannheimsia tianzena* (Liu) (modified from Liu, 1995); (14) photograph of *Mannheimsia stylodactyla* (Liu).

Fig. 15. Scanning electron micrograph of head, *Mannheimsia stricta* Beyer, right lateral (material adhering to lower margin of flagellomere 1 and palpus is conducting paint).

Scale bar = 0.5 mm, except Fig. 15 = 0.25 mm.

Material examined: THAILAND: *Chiang Mai*: Doi Inthanon National Park, 1260 m, 1♀ 31.i–7.ii.1989, Malaise trap, T. Thormin (LACM); Maerim (18.29°N: 98.98°E), 1♀ 3–26.i.1995, 1♀ viii–ix.1995, 4♂ 1♀ xi–xii.1995, 1♂ 1♀ i–ii.1996, Malaise trap, R. Beaver (LACM); *Nakhon Ratchasima*: Khao Yai National Park, semi-evergreen forest, 780 m, 3♀ 11–16.iv.1990, B. Brown, 2♀ 11–18.iv.1990, Malaise trap, E. Fuller (LACM).

Remarks: Mostovski described *C. ramai* from Thailand from a specimen extremely similar in appearance to illustrations of *C. stylodactyla.* In particular, illustrations of the terminalia of the two were almost identical, although the illustrations by both authors, especially of the male terminalia, were not greatly detailed. Mostovski stated that his new species differed from both of Liu's previously described species by having fewer setae on the palpus, lacking a large seta above the thoracic spiracle, by the different costal index and costal sector measurements, the distribution of setae on the midtibia, and by shape of the epandrium and hypandrium. Furthermore, he stated that *C. ramai* differed from *C. stylodactyla* by the dark club of the halter and longer setae on the cercus.

I have several specimens of a species I consider conspecific with *C. ramai*, as it agrees well with all of Mostovski's illustrations. After reviewing the supposed differences between this species and the illustrations of *C. stylodactyla*, however, I consider them to be conspecific. The number of setae on the palpus in my specimens is the same as in

C. stylodactyla. The large seta above the spiracle—basal postpronotal seta in the terminology of McAlpine (1981)—is present in my specimens. The differences in wing measurements and small differences in location in midtibial setae are errors in the illustrations of Liu. Part of the difference in male terminalia noted by Mostovski is due to an error in his illustration. The long digitiform structure he illustrates in his fig. 4 as the right surstylus, continuous with the right side of the epandrium, is in fact the medial process of the subepandrial process (Figs 7, 8). The differences in the ventral view of the hypandrium appear to be small variations in angle of observation in the two species. Finally, the halter of both species is dark-coloured, and the illustrations of the terminalia by Liu depict the length of the cercal setae too short.

It is clear from the illustrations of the male terminalia that the subepandrial process has exactly the same structure in both species. Given that there are small errors in the illustrations of both authors, and without other substantive characters that might separate the two, I herein synonymize the names. Additionally, I synonymize the new name *C. dactyloformis* that Liu (2001) introduced in error in his book on Chinese phorids.

Neither author illustrated the full structure of the hypandrium, probably confusing part of this structure with the aedeagus. Specifically, the right side of the hypandrium has an unusual bilobed secondary process dorsal to the large, more obvious process (Fig. 9).

Mannheimsia tianzena (Liu, 1995), **comb. n.**

Figs 10, 13

Chouomyia tianzena Liu, 1995: 186, figs 1–10.

Material examined: CHINA: Shaanxi, 1♂ 22.vi.1993, G. Liu (LACM).

Remarks: The original description did not include the secondary process of the right hypandrial lobe; likely the author considered it to be part of the aedeagus. My illustration (Fig. 10) differs somewhat from that of Liu because it is drawn at a slightly different angle.

Key to males of *Mannheimsia* Beyer

1. Wing veins M_1 and M_2 extremely close together basally (Fig. 13); veins M_2 and CuA_1 widely separated; China .... *M. tianzena* (Liu)
– Wing veins more evenly distributed (Fig. 14) 2
2. Surstylus-like process with distinct ventral, fingerlike projection in left lateral view (Fig. 8); southeast Asia .... *M. stylodactyla* (Liu)
– Surstylus-like process without narrow ventral process in left lateral view (Fig. 4); Africa .... *M. stricta* Beyer

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REFERENCES

Beyer, E.M. 1965. Phoridae. *Exploration Parc National Albert, Mission G.F. de Witte* **99**: 1–211.

Brown, B.V. 1992*a*. Generic revision of Phoridae of the Nearctic region and phylogenetic classification of Phoridae, Sciadoceridae, and Ironomyiidae (Diptera: Phoridea). *Memoirs of the Entomological Society of Canada* **164**: 1–144.

———1992*b*. Life history, immature stages and undescribed male of *Rhynchomicropteron* (Diptera: Phoridae). *Journal of Natural History* **26**: 407–416.

———1994. Descriptions and subfamily classification of some unusual Phoridae (Diptera). *The Canadian Entomologist* **126**: 703–707.

———1995. Response to Disney. *Journal of Natural History* **29**: 259–264.

Cook, C.E., Austin, J.J. & Disney, R.H.L. 2004. A mitochondrial 12S and 16S rRNA phylogeny of critical genera of Phoridae (Diptera) and related families of Aschiza. *Zootaxa* **593**: 1–11.

Disney, R.H.L. 1993. Mosaic evolution and outgroup comparisons. *Journal of Natural History* **27**: 1219–1221.

———1994. *Scuttle flies – the Phoridae*. London: Chapman & Hall.

———1995. Reply to Brown. *Journal of Natural History* **29**: 1081–1082.

———2003. The dorsal abdominal glands and the higher classification of the Phoridae (Diptera). *Zootaxa* **293**: 1–16.

Liu, G. 1995. A new genus *Chouomyia* with two new species from China (Diptera, Phoridae). *Studia Dipterologica* **2**: 185–188.

———2001. *A taxonomic study of Chinese phorid flies (Diptera: Phoridae). Part 1*. Shenyang: NEU Press.

McAlpine, J.F. 1981. Morphology and terminology – adults. *In*: McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M., eds, *Manual of Nearctic Diptera, Volume 1*. Agriculture Canada Monograph 27, Ottawa, pp. 9–63.

Mostovski, M.B. 1997. A new species of the genus *Chouomyia* (Diptera, Phoridae) from southern Thailand. *Zoologicheskii Zhurnal* **76**: 876–877. (in Russian)

Schmitz, H. 1927. Revision der Phoridengattungen, mit Beschreibung neuer Gatungen und Arten. *Natuurhistorisch Maandblad* **16**: 30–40, 45–50, 59–65, 72–79, 92–100, 110–116, 128–132, 142–148, 164, 176.

———1929. *Revision der Phoriden*. Berlin & Bonn: F. Dümmler.